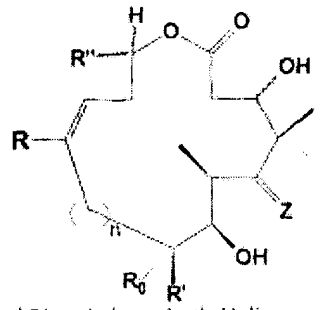
Clmpto 1626

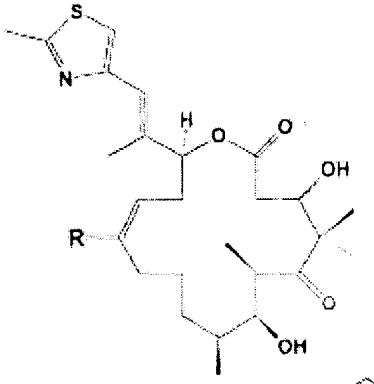
C. Styles

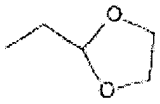
1. A compound having the structure:



wherein R, R_6, and R' are independently H, linear or branched chain alkyl, optionally substituted by hydroxy, alkoxy, carboxy, carboxaldedyde linear or branched alkyl or cyclic acetal, fluorine, NR_1R_2, N-hydroximino, or N-alkoxyimino, wherein R_1 and R_2 are independently H, phenyl, benzyl, linear or branched chain alkyl; wherein R'' is -CHY=CHX, or H, linear or branched chain alkyl, phenyl, 2-methyl-1,3-thiazolinyl, 2-furanyl, 3-furanyl, 4-furanyl, 2-pyridyl, 3-pyridyl, 4-pyridyl, imidazolyl, 2-methyl-1,3-oxazolinyl, 3-indolyl or 6-indolyl; and wherein X is H, linear or branched chain alkyl, phenyl, 2-methyl-1,3-thiazolinyl, 2-furanyl, 3-furanyl, 4-furanyl, 2-pyridyl, 3-pyridyl, 4-pyridyl, imidazolyl, 2-methyl-1,3-oxazolinyl, 3-indolyl or 6-indolyl; wherein Y is H or linear or branched chain alkyl; wherein Z is O, $N(OR_3)$ or $N\text{-}NR_4R_5$, wherein R_3, R_4 and R_5 are independently H or a linear or branched alkyl; and wherein n is 0, 1, 2, or 3.

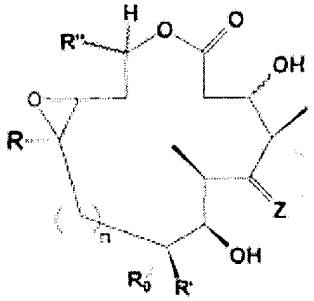
2. The compound of claim 1 having the structure:



wherein R is H, methyl, ethyl, n-propyl, n-butyl, n-hexyl,  or

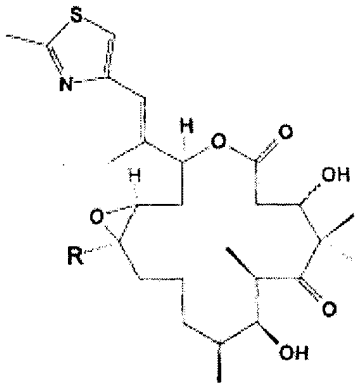
$(CH_2)_3$-OH.

3. A compound having the structure:



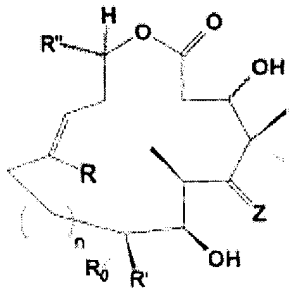
wherein R, R_9, and R' are independently H, linear or branched chain alkyl, optionally substituted by hydroxy, alkoxy, carboxy, carboxaldedyde linear or branched alkyl or cyclic acetal, fluorine, NR_1R_2, N-hydroximino, or N-alkoxyimino, wherein R_1 and R_2 are independently H, phenyl, benzyl, linear or branched chain alkyl; wherein R" is -CHY=CHX, or H, linear or branched chain alkyl, phenyl, 2-methyl-1,3-thiazolinyl, 2-furanyl, 3-furanyl, 4-furanyl, 2-pyridyl, 3-pyridyl, 4-pyridyl, imidazolyl, 2-methyl-1,3-oxazolinyl, 3-indolyl or 6-indolyl; and wherein X is H, linear or branched chain alkyl, phenyl, 2-methyl-1,3-thiazolinyl, 2-furanyl, 3-furanyl, 4-furanyl, 2-pyridyl, 3-pyridyl, 4-pyridyl, imidazolyl, 2-methyl-1,3-oxazolinyl, 3-indolyl or 6-indolyl; wherein Y is H or linear or branched chain alkyl; wherein Z is O, $N(OR_3)$ or $N\text{-}NR_3R_4$, wherein R_3, R_4 and R_5 are independently H or a linear or branched chain alkyl; and wherein n is 0, 1, 2, or 3.

4. The compound of claim 3 having the structure:



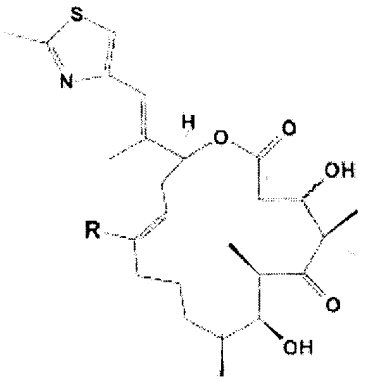
wherein R is H, methyl, ethyl, n-propyl, n-butyl or n-hexyl.

5. A compound having the structure:



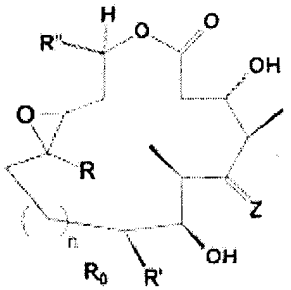
wherein R, R_0, and R' are independently H, linear or branched chain alkyl, optionally substituted by hydroxy, alkoxy, carboxy, carboxaldedyde linear or branched alkyl or cyclic acetal, fluorine, NR_1R_2, N-hydroximino, or N-alkoxyimino, wherein R_1 and R_2 are independently H, phenyl, benzyl, linear or branched chain alkyl; wherein R" is -CHY=CHX, or H, linear or branched chain alkyl, phenyl, 2-methyl-1,3-thiazolinyl, 2-furanyl, 3-furanyl, 4-furanyl, 2-pyridyl, 3-pyridyl, 4-pyridyl, imidazolyl, 2-methyl-1,3-oxazolinyl, 3-indolyl or 6-indolyl; and wherein X is H, linear or branched chain alkyl, phenyl, 2-methyl-1,3-thiazolinyl, 2-furanyl, 3-furanyl, 4-furanyl, 2-pyridyl, 3-pyridyl, 4-pyridyl, imidazolyl, 2-methyl-1,3-oxazolinyl, 3-indolyl or 6-indolyl; wherein Y is H or linear or branched chain alkyl; wherein Z is O, $N(OR_3)$ or $N\text{-}NR_4R_5$, wherein R_3, R_4 and R_5 are independently H or a linear or branched chain alkyl; and wherein n is 0, 1, 2, or 3.

6. The compound of claim 5 having the structure:



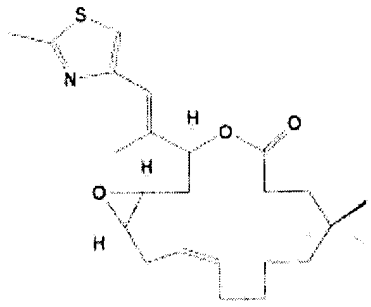
wherein R is H, methyl, etnyl, n-propyl, n-butyl, n-hexyl or hydroxypropyl.

7. A compound having the structure:

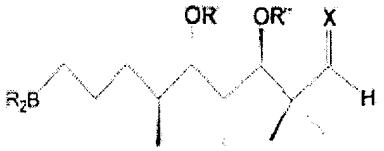


wherein R, R_0, and R' are independently H, linear or branched chain alkyl, optionally substituted by hydroxy, alkoxy, carboxy, carboxaldedyde linear or branched alkyl or cyclic acetal, fluorine, NR_1R_2, N-hydroximino, or N-alkoxyimino, wherein R_1 and R_2 are independently H, phenyl, benzyl, linear or branched chain alkyl; wherein R" is -CHY=CHX, or H, linear or branched chain alkyl, phenyl, 2-methyl-1,3-thiazolinyl, 2-furanyl, 3-furanyl, 4-furanyl, 2-pyridyl, 3-pyridyl, 4-pyridyl, imidazolyl, 2-methyl-1,3-oxazolinyl, 3-indolyl or 6-indolyl; and wherein X is H, linear or branched chain alkyl, phenyl, 2-methyl-1,3-thiazolinyl, 2-furanyl, 3-furanyl, 4-furanyl, 2-pyridyl, 3-pyridyl, 4-pyridyl, imidazolyl, 2-methyl-1,3-oxazolinyl, 3-indolyl or 6-indolyl; wherein Y is H or linear or branched chain alkyl; wherein Z is O, $N(OR_3)$ or $N\text{-}NR_4R_5$, wherein R_3, R_4 and R_5 are independently H or a linear or branched chain alkyl or alkoxy; and wherein n is 0, 1, 2, or 3.

8. A compound having the structure:

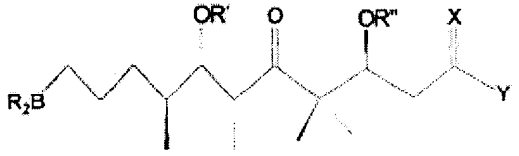


9. A compound having the structure:



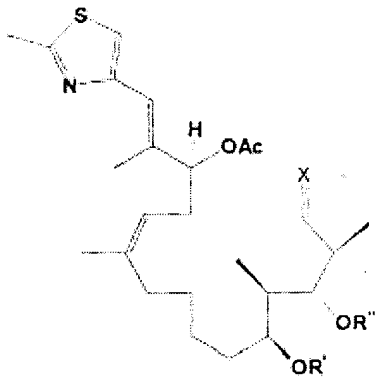
wherein R' and R'' are independently hydrogen, a linear or branched alkyl, substituted or unsubstituted aryl or benzyl, trialkylsilyl, dialkylarylsilyl, alkyldiarylsilyl, a linear or branched acyl, substituted or unsubstituted aroyl or benzoyl; wherein X is oxygen, $(OR^*)_2$, $(SR^*)_2$, -(O-$(CH_2)_n$-O)-, -(O-$(CH_2)_n$-S)- or -(S-$(CH_2)_n$-S)-; wherein R* is a linear or branched alkyl, substituted or unsubstituted aryl or benzyl; wherein R_2B is a linear, branched or cyclic alkyl or substituted or unsubstituted aryl or benzyl boranyl moiety; and wherein n is 2, 3 or 4.

10. A compound having the structure:



wherein R' and R'' are independently hydrogen, a linear or branched alkyl, substituted or unsubstituted aryl or benzyl, trialkylsilyl, dialkylarylsilyl, alkyldiarylsilyl, a linear or branched acyl, substituted or unsubstituted aroyl or benzoyl; wherein X is oxygen, $(OR^*)_2$, $(SR^*)_2$, -(O-$(CH_2)_n$-O)-, -(O-$(CH_2)_n$-S)- or -(S-$(CH_2)_n$-S)-; wherein R* is a linear or branched alkyl, substituted or unsubstituted aryl or benzyl; wherein R_2B is a linear, branched or cyclic alkyl or substituted or unsubstituted aryl or benzyl boranyl moiety; wherein Y is OH, linear or branched chain alkoxy, trimethylsilyloxy, t-butyldimethylsilyloxy or methyldiphenysilyloxy; and wherein n is 2, 3 or 4.

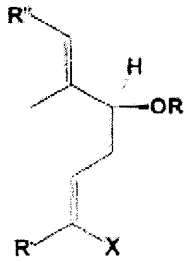
11. A compound having the structure:



wherein R' and R'' are independently hydrogen, a linear or branched alkyl, substituted or unsubstituted aryl or benzyl, trialkylsilyl, dialkylarylsilyl, alkyldiarylsilyl, a linear or branched acyl, substituted or unsubstituted aroyl or benzoyl; wherein X is oxygen, $(OR)_2$, $(SR)_2$, -(O-$(CH_2)_n$-O)-, -(O-$(CH_2)_n$-S)- or -(S-$(CH_2)_n$-S)-; and wherein n is 2, 3 or 4.

12. The compound of claim 11 wherein R' is TBS, R'' is TPS and X is $(OMe)_2$.

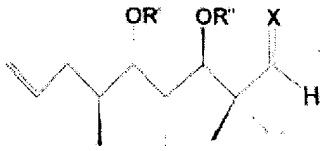
13. A compound having the structure:



wherein R is hydrogen, a linear or branched alkyl, alkoxyalkyl, substituted or unsubstituted aryloxyalkyl, linear or branched acyl, substituted or unsubstituted aroyl or benzoyl; wherein X is a halogen; wherein R'' is H, linear or branched chain alkyl, phenyl, 2-methyl-1,3-thiazolinyl, 2-furanyl, 3-furanyl, 4-furanyl, 2-pyridyl, 3-pyridyl, 4-pyridyl, imidazolyl, 2-methyl-1,3-oxazolinyl, 3-indolyl or 6-indolyl; and wherein Y is H or linear or branched chain alkyl.; wherein R' is H, linear or branched chain alkyl, hydroxymethyl, hydroxypropyl, alkyl carboxaldehyde, alkyl carboxaldehyde linear or cyclic acetal; and X is a halide.

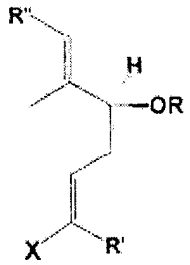
14. The compound of claim 13 wherein R is acetyl and X is iodo.

15. A compound having the structure:



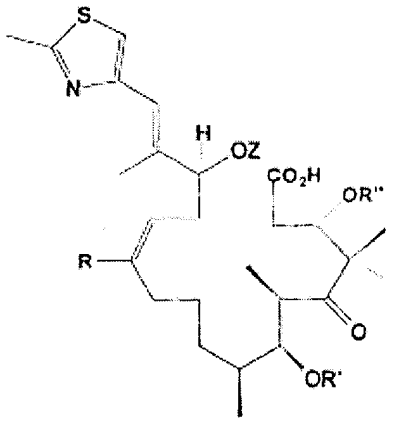
wherein R' and R'' are independently hydrogen, a linear or branched alkyl, substituted or unsubstituted aryl or benzyl, trialkylsilyl, dialkylarylsilyl, alkyldiarylsilyl, a linear or branched acyl, substituted or unsubstituted aroyl or benzoyl; wherein X is oxygen, $(OR)_2$, $(SR)_2$, -(O-$(CH_2)_n$-O)-, -(O-$(CH_2)_n$-S)- or -(S-$(CH_2)_n$-S)-; and wherein n is 2, 3 or 4.

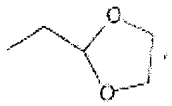
16. A compound having the structure:



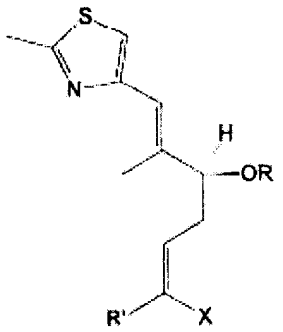
wherein R is hydrogen, a linear or branched alkyl, alkoxyalkyl, substituted or unsubstituted aryloxyalkyl, linear or branched acyl, substituted or unsubstituted acoyl or benzoyl; wherein X is a halogen; wherein R' is H, linear or branched chain alkyl, alkyl carboxaldehyde, alkyl carboxaldehyde linear or cyclic acetal; wherein R'' is H, linear or branched chain alkyl, phenyl, 2-methyl-1,3-thiazolinyl, 2-furanyl, 3-furanyl, 4-furanyl, 2-pyridyl, 3-pyridyl, 4-pyridyl, imidazolyl, 2-methyl-1,3-oxazolinyl, 3-indolyl or 6-indolyl; and wherein Y is H or linear or branched chain alkyl.

17. A compound having the structure:

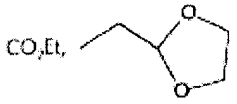


wherein R is hydrogen, methyl, ethyl, n-propyl, n-hexyl, CO_2Et,  , CH_2OH; or $(CH_2)_3$-OH; wherein R' and R'' are independently hydrogen, a linear or branched alkyl, substituted or unsubstituted aryl or benzyl, trialkylsilyl, dialkylarylsilyl, alkyldiarylsilyl, a linear or branched acyl, substituted or unsubstituted aroyl or benzoyl; and wherein Z is hydrogen, or linear or branched chain alkyl.

18. A method of preparing a Z-haloalkene ester having the structure:



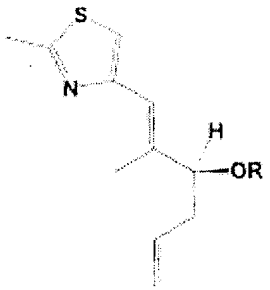
wherein R is hydrogen, a linear or branched alkyl, alkoxyalkyl, substituted or unsubstituted aryloxyalkyl, linear or branched acyl, substituted or unsubstituted aroyl or benzoyl; wherein R' is hydrogen, methyl, ethyl, n-propyl, n-hexyl,



, CH_2OH or $(CH_2)_2$-OH; and wherein X is a halogen,

which comprises

(a) oxidatively cleaving a compound having the structure:



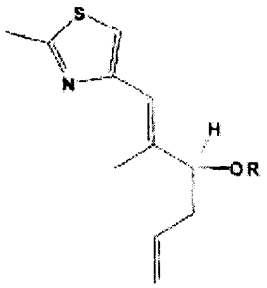
under suitable conditions to form an aldehyde intermediate; and

(b) condensing the aldehyde intermediate with a halomethylene transfer agent under suitable conditions to form the Z-haloalkene ester.

19. The method of claim 18 wherein X is iodine.

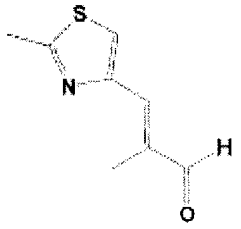
20. The method of claim 18 wherein the halomethylene transfer agent is $Ph_3P=CR'I$ or $(Ph_3P^+CHR'I)I^-$

21. A method of preparing an optically pure compound having the structure:

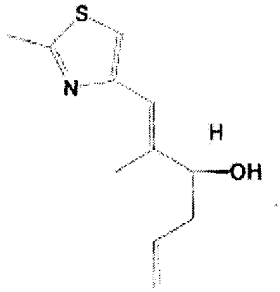


wherein R is hydrogen, a linear or branched alkyl, alkoxyalkyl, substituted or unsubstituted aryloxyalkyl, linear or branched acyl, substituted or unsubstituted aroyl or benzoyl, which comprises:

(a) condensing an allylic organometallic reagent with an unsaturated aldehyde having the structure:



under suitable conditions to form an alcohol, and, optionally concurrently therewith, optically resolving the alcohol to form an optically pure alcohol having the structure:



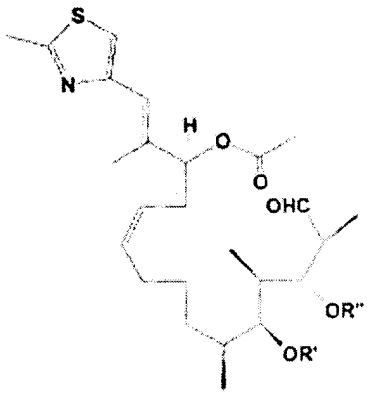
(b) alkylating or acylating the optically pure alcohol formed in step (a) under suitable conditions to form the optically pure compound.

22. The method of claim 21 wherein the allylic organometallic reagent is an allyl(trialkyl)stannane.

23. The method of claim 21 wherein the condensing step is effected using a reagent comprising a titanium tetraalkoxide and an optically active catalyst.

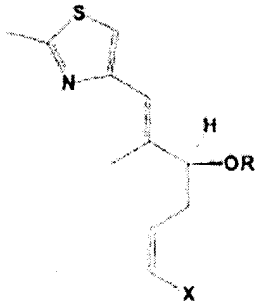
24. The method of claim 23 wherein the optically active catalyst is SI-BINOL.

25. A method of preparing an open-chain aldehyde having the structure:

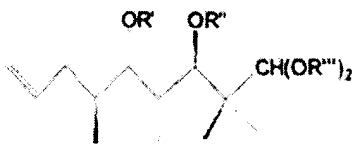


wherein R' and R'' are independently hydrogen, a linear or branched alkyl, substituted or unsubstituted aryl or benzyl, trialkylsilyl, dialkylarylsilyl, alkyldiarylsilyl, a linear or branched acyl, substituted or unsubstituted aroyl or benzoyl, which comprises:

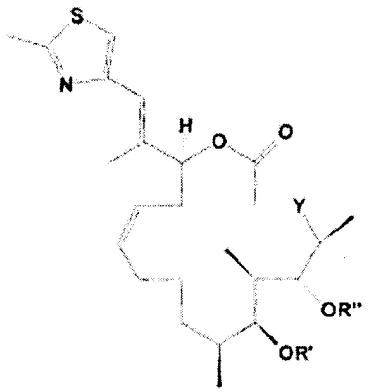
(a) cross-coupling a haloolefin having the structure:



wherein R is a linear or branched alkyl, alkoxyalkyl, substituted or unsubstituted aryloxyalkyl, trialkylsilyl, aryldialkylsilyl, diarylalkylsilyl, triarylsilyl, linear or branched acyl, substituted or unsubstituted aroyl or benzoyl, and X is a halogen, with a terminal olefin having the structure:



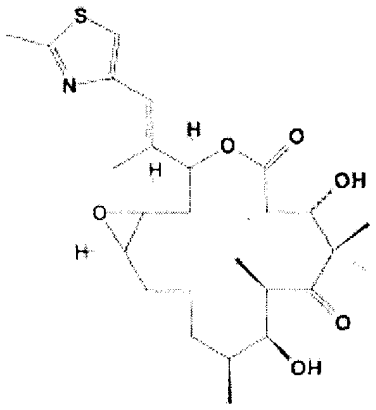
wherein $(OR'')_2$ is $(OR_b)_2$, $(SR_b)_2$, -[O-$(CH_2)_n$-O]-, -[O-$(CH_2)_n$-S]- or -[S-$(CH_2)_n$-S]- where R_b is a linear or branched alkyl, substituted or unsubstituted aryl or benzyl; and wherein n is 2, 3 or 4, under suitable conditions to form a cross coupled compound having the structure:



wherein Y is $CH(OR^*)_2$ where R^* is a linear or branched alkyl, alkoxyalkyl, substituted or unsubstituted aryloxyalkyl; and

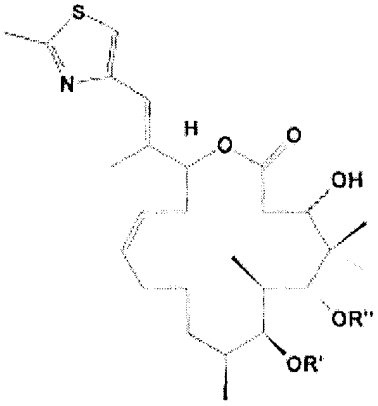
(b) deprotecting the cross-coupled compound formed in step (a) under suitable conditions to form the open-chain compound.

26. A method of preparing an epothilone having the structure:

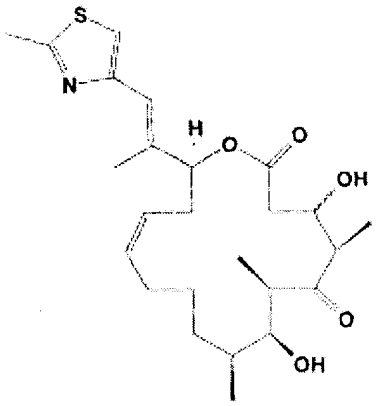


which comprises:

(a) deprotecting a cyclized compound having the structure:



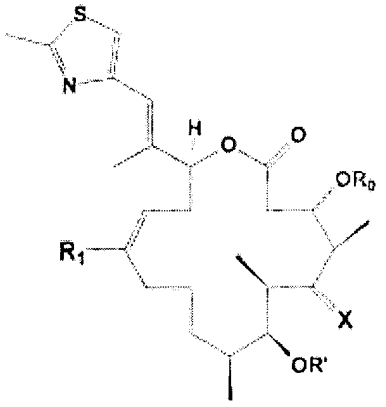
wherein R' and R'' are independently hydrogen, a linear or branched alkyl, substituted or unsubstituted aryl or benzyl, trialkylsilyl, dialkylarylsilyl, alkyldiarylsilyl, a linear or branched acyl, substituted or unsubstituted aroyl or benzoyl, under suitable conditions to form a deprotected cyclized compound and oxidizing the deprotected cyclized compound under suitable conditions to form a desoxyepothilone having the structure:



and

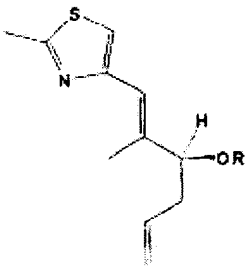
(b) epoxidizing the desoxyepothilone formed in step (a) under suitable conditions to form the epothilone.

27. A method of preparing an epothilone precursor having the structure:

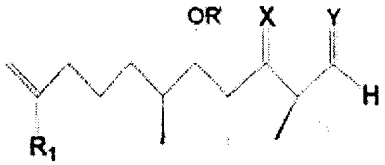


wherein R_1 is hydrogen or methyl; wherein X is O, or a hydrogen and OR', each singly bonded to carbon; and wherein R_0, R' and R'' are independently hydrogen, a linear or branched alkyl, substituted or unsubstituted aryl or benzyl, trialkylsilyl, dialkylarylsilyl, alkyldiarylsilyl, a linear or branched acyl, substituted or unsubstituted aroyl or benzoyl, which comprises

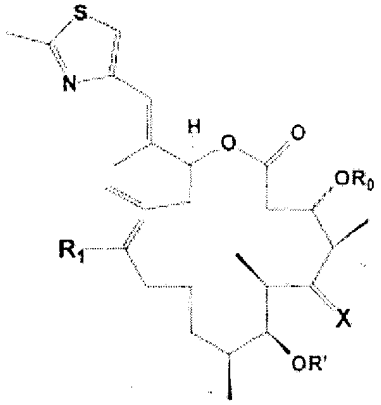
(a) coupling a compound having the structure:



wherein R is an acetyl, with an aldehyde having the structure:



wherein Y is oxygen, under suitable conditions to form an aldol intermediate and optionally protecting the aldol intermediate under suitable conditions to form an acyclic epothilone precursor having the structure:



(b) subjecting the acylic epothilone precursor to conditions leading to intramolecular olefin metathesis to form the epothilone precursor.

28. The method of claim 27 wherein the conditions leading to intramolecular olefin metathesis require the presence of an organometallic catalyst.

29. The method of claim 27 wherein the catalyst is a Ru or Mo complex.

30. A pharmaceutical composition for treating cancer comprising a compound of claim 1,

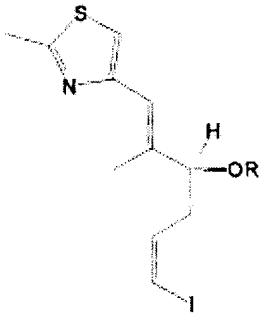
3, 5, 7, or 8 and a pharmaceutically suitable carrier.

31. A method of treating cancer in a subject suffering therefrom comprising administering to the subject a therapeutically effective amount of a compound of claim 1, 3, 5, 7 or 8 and a pharmaceutically suitable carrier.

32. The method of claim 31 wherein the cancer is a solid tumor.

33. The method of claim 31 wherein the cancer is breast cancer.

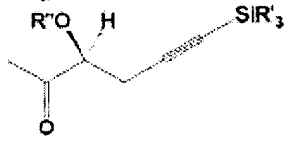
34. A method of preparing a Z-iodoalkene ester having the structure:



wherein R is hydrogen, a linear or branched alkyl, alkoxyalkyl, substituted or unsubstituted aryloxyalkyl, linear or branched acyl, substituted or unsubstituted aroyl or benzoyl, which comprises

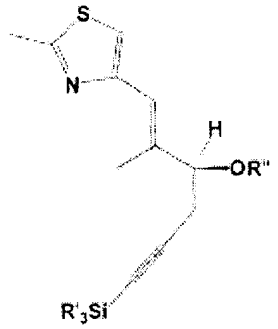
(a) coupling a compound having the structure:

with a methyl ketone having the structure:

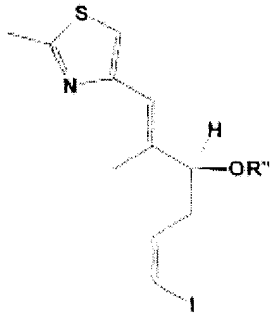


wherein R' and R'' are independently a linear or branched alkyl.

alkoxyalkyl, substituted or unsubstituted aryl or benzyl, under suitable conditions to form a compound having the structure:



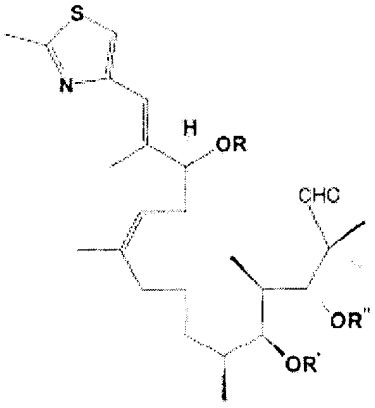
(b) treating the compound formed in step (a) under suitable conditions to form a Z-iodoalkene having the structure:



and

(c) deprotecting and acylating the Z-iodoalkene formed in step (b) under suitable conditions to form the Z-iodoalkene ester.

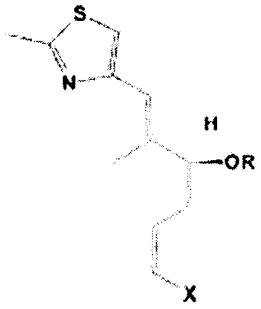
35. A method of preparing an open-chain aldehyde having the structure:



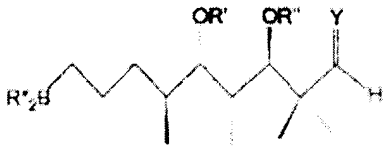
wherein R is a linear or branched alkyl, alkoxyalkyl, substituted or unsubstituted

aryloxyalkyl, trialkylsilyl, aryldialkylsilyl, diarylalkylsilyl, triarylsilyl, linear or branched acyl, substituted or unsubstituted aroyl or benzoyl; and wherein R'' and R''' are independently hydrogen, a linear or branched alkyl, substituted or unsubstituted aryl or benzyl, trialkylsilyl, dialkylarylsilyl, alkyldiarylsilyl, a linear or branched acyl, substituted or unsubstituted aroyl or benzoyl, which comprises:

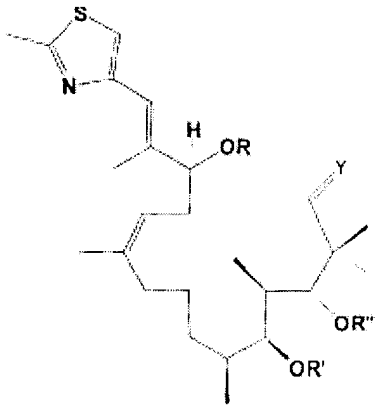
(a) cross-coupling a haloolefin having the structure:



wherein X is a halogen, with a terminal hydroborane having the structure:



wherein R*2B is a linear, branched or cyclic alkyl or substituted or unsubstituted aryl or benzyl boranyl moiety; wherein Y is $(OR_5)_2$, $(SR_5)_2$, -(O-(CH2)n-O)-, -(O-(CH2)n-S)- or -(S-(CH2)n-S)- where R_5 is a linear or branched alkyl, substituted or unsubstituted aryl or benzyl; and wherein n is 2, 3 or 4, under suitable conditions to form a cross-coupled compound having the structure:

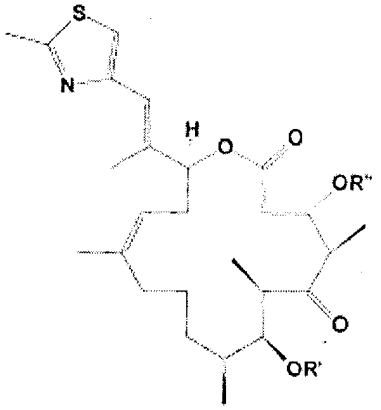


and

(b) deprotecting the cross-coupled compound formed in step (a) under suitable conditions to form the open-chain aldehyde.

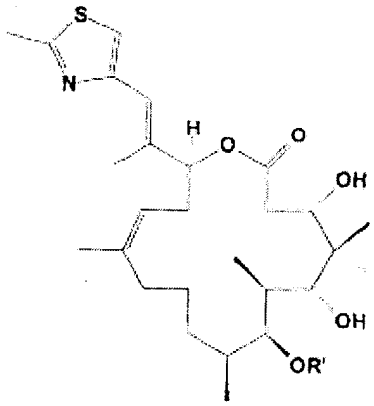
36. The method of claim 35 wherein R is acetyl; R' is TBS; R'' is TPS; R^*_2B is derived from 9-BBN; and Y is $(OMe)_2$.

37. A method of preparing a protected epothilone having the structure:

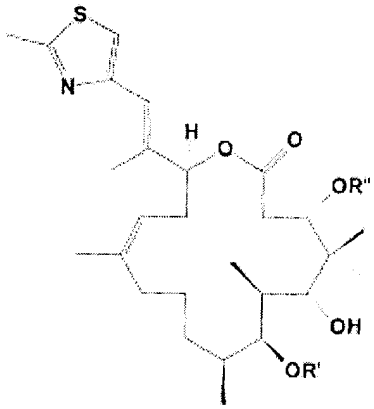


wherein R' and R'' are independently hydrogen, a linear or branched alkyl, substituted or unsubstituted aryl or benzyl, trialkylsilyl, dialkyl-arylsilyl, alkyldiarylsilyl, a linear or branched acyl, substituted or unsubstituted aroyl or benzoyl, which comprises:

(a) monoprotecting a cyclic diol having the structure:



under suitable conditions to form a cyclic alcohol having the structure:

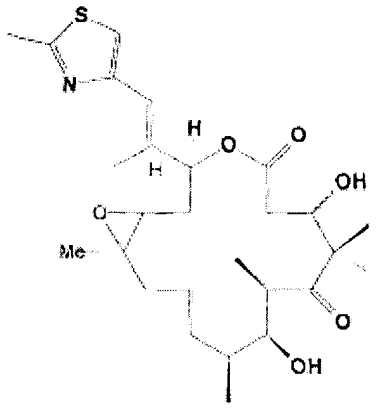


and

(b) oxidizing the cyclic alcohol formed in step (a) under suitable conditions to form the protected epothilone.

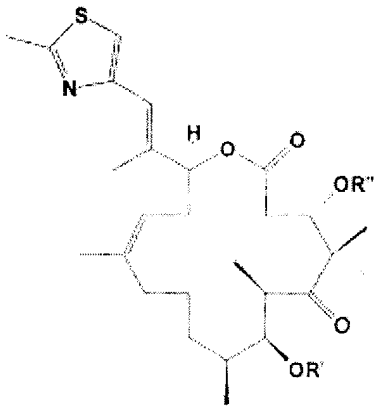
38. The method of claim 37 wherein R' and R'' are TBS.

39. A method of preparing an epothilone having the structure:

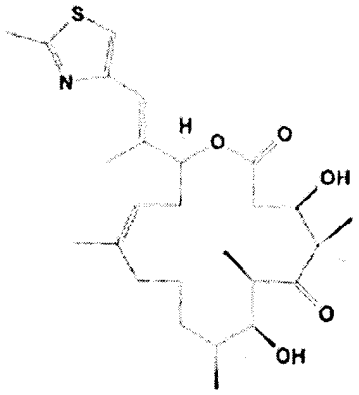


which comprises:

(a) deprotecting a protected cyclic ketone having the structure:



wherein R'' and R''' are independently hydrogen, a linear or branched alkyl, substituted or unsubstituted aryl or benzyl, trialkylsilyl, dialkylarylsilyl, alkyldiarylsilyl, a linear or branched acyl, substituted or unsubstituted aroyl or benzoyl, under suitable conditions to form a desoxyepothilone having the structure:

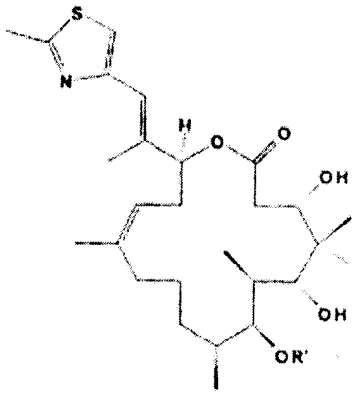


and

(b) epoxidizing the desoxyepothilone formed in step (a) under suitable conditions to form the epothilone.

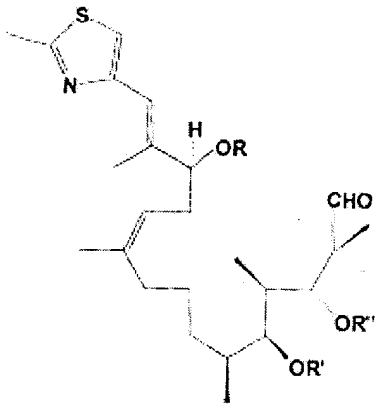
40. The method of claim 39 wherein R' and R'' are TBS.

41. A method of preparing a cyclic diol having the structure:

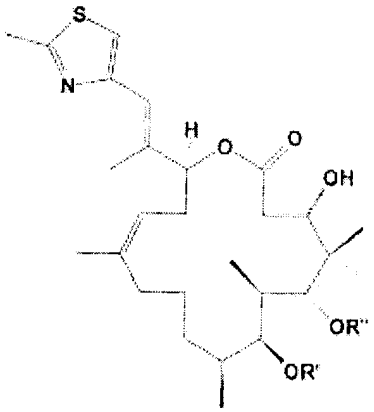


wherein R' is a hydrogen, a linear or branched alkyl, substituted or unsubstituted aryl or benzyl, trialkylsilyl, dialkylarylsilyl, alkyldiarylsilyl, a linear or branched acyl, substituted or unsubstituted aroyl or benzoyl, which comprises:

(a) cyclizing an open-chain aldehyde having the structure:



wherein R is a linear or branched alkyl, alkoxyalkyl, substituted or unsubstituted aryloxyalkyl, trialkylsilyl, aryldialkylsilyl, diarylalkylsilyl, triarylsilyl, linear or branched acyl, substituted or unsubstituted aroyl or benzoyl; and wherein R'' is a hydrogen, a linear or branched alkyl, substituted or unsubstituted aryl or benzyl, trialkylsilyl, dialkylarylsilyl, alkyldiarylsilyl, a linear or branched acyl, substituted or unsubstituted aroyl or benzoyl under suitable conditions to form an enantiomeric mixture of a protected cyclic alcohol having the structure:



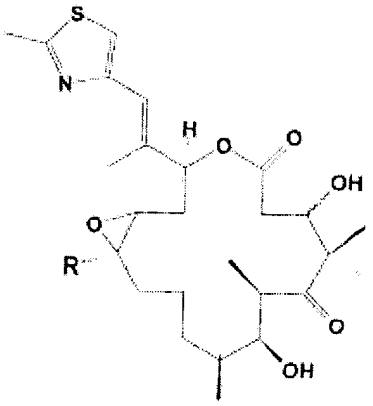
said mixture comprising an α- and a β-alcohol component;

(b) optionally isolating and oxidizing the α-alcohol formed in step (a) under suitable conditions to form a ketone and thereafter reducing the ketone under suitable conditions to form an enantiomeric mixture of the protected cyclic alcohol comprising substantially the β-alcohol; and

(c) treating the protected cyclic alcohol formed in step (a) or (b) with a deprotecting agent under suitable conditions to form the cyclic diol.

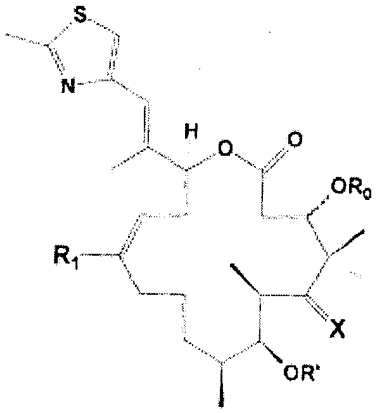
42. The method of claim 41 wherein R' is TBS and R'' is TPS.

43. A purified compound having the structure:



wherein R is hydrogen, methyl, ethyl, propyl, hexyl, hydroxymethyl or hydroxypropyl, wherein X is O; and wherein R_0, R' and R'' are independently hydrogen or acetyl.

44. A purified compound having the structure:



wherein R_1 is hydrogen, methyl, ethyl, propyl, hexyl, hydroxymethyl or hydroxypropyl; wherein X is O; and wherein R_0, R' and R'' are independently hydrogen or acetyl.

45. A composition comprising an amount of the compound of claim 1, 2, 3, 4, 5, 6, 7, 8, 43 or 44 effective to inhibit the growth of multidrug resistant cells and a

pharmaceutically acceptable carrier.

46. The composition of claim 45, further comprising an amount of a cytotoxic agent.

47. The composition of claim 46, wherein the cytotoxic agent is an anticancer agent.

48. The composition of claim 47, wherein the anticancer agent is adriamycin.

49. The composition of claim 47, wherein the anticancer agent is vinblastin.

50. The composition of claim 47, wherein the anticancer agent is paclitaxel.

51. The composition of claim 45, wherein the effective amount of the compound is between about 0.01 mg/kg to about 25 mg/kg of body weight.

52. A method of inhibiting the growth of multidrug resistant cells comprising contacting the multidrug resistant cells with an amount of the compound of claim 1, 2, 3, 4, 5, 6, 7, 8, 43 or 44 effective to inhibit the growth of multidrug resistant cells in combination with a pharmaceutically acceptable carrier.

53. The method of claim 52, further comprising administering an amount of a cytotoxic agent.

54. The method of claim 53, wherein the cytotoxic agent is an anticancer agent.

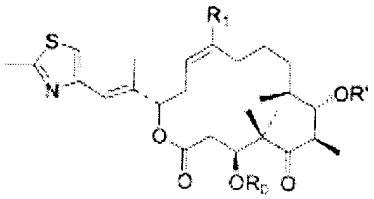
55. The method of claim 54, wherein the anticancer agent is adriamycin.

56. The method of claim 55, wherein the anticancer agent is vinblastin.

57. The method of claim 55, wherein the anticancer agent is paclitaxel.

58. The method of claim 55, wherein the effective amount of the compound is between about 0.01 mg/kg to about 25 mg/kg of body weight.

59. A compound having the structure:



wherein R_1 is hydrogen or methyl, and R_6 and R' are each hydrogen.